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Indian Standard

METHOD FOR SENSORY
EVALUATION OF PUNGENCY OF
GINGER BY SCOVILLE UNITS

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Indian Standard

METHOD FOR SENSORY EVALUATION OF PUNGENCY OF GINGER BY SCOVILLE UNITS

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Indian Standard

**METHOD FOR SENSORY
EVALUATION OF PUNGENCY OF
GINGER BY SCOVILLE UNITS**

0. FOREWORD

0.1 This Indian Standard was adopted by the Indian Standards Institution on 28 February 1986, after the draft finalized by the Sensory Evaluation Sectional Committee, had been approved by the Agricultural and Food Products Division Council.

0.2 Pungency is the important sensory characteristic in ginger in addition to aroma. Its evaluation is important especially as pungency varies greatly with storage period and form in which stored as whole, powder or oleoresin.

Pungency is elicited by gingerol, the (6)-homologue of the phenyl and alkyl-3-one and its dehydration product shogaol.

Chemical estimation of both gingerol and shogaol is important while estimating the pungency of ginger as shogaol is proved to be twice as pungent as gingerol.

Scoville units of total ginger oleoresin or extract of powder (5 percent moisture) will give an estimate of both the pungent compounds.

0.3 In the preparation of this standard, considerable assistance has been derived from the research investigations carried out at the Central Food Technological Research Institute, Mysore.

0.4 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS:2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard prescribed a method for sensory evaluation of pungency in ginger by Scoville Units (SU) corresponding to the recognition threshold.

*Rules for rounding off numerical values (revised).

1.2 This procedure is applicable to ginger whole (fresh and dry rhizomes) powder or oleoresin. The tables are interchangeable.

2. TERMINOLOGY

2.0 For the purpose of this standard, the following definition shall apply.

2.1 Scoville Unit — Reciprocal of the lowest concentration of the stimulus at which pungency is recognized by a defined panel.

3. OPTIMUM REQUIREMENT

3.1 Optimum requirements for sensory evaluation of pungency of ginger shall be as described in IS : 6273 (Part 1)-1971*.

3.2 Modified booth in the laboratory can be used alternately but with the same care as in threshold tests of IS : 6273 (Part 2)-1971†.

4. PRINCIPLE

4.1 Determining pungency in test sample through threshold tests using ascending concentration series as described for chillies and expressing the Scoville Units in accordance with IS : 8104-1976‡.

4.2 Evaluation with pure natural capsaicin or piperine for the purpose of selection of homogeneous panel and definition of the panel sensitivity.

5. REAGENTS

5.1 Unless specified otherwise, pure chemicals and distilled water (see IS : 1070-1960§) shall be employed.

5.2 Ethanol — 95 percent.

5.3 Sugar Solution — 3 percent solution of sucrose in water.

5.4 Glycerol monostearate at levels of 10 ppm to be used in case of stored, old samples of oleoresin.

6. APPARATUS

6.1 Round Bottom Flask with Reflux Condenser — 200 ml capacity.

6.2 Volumetric Flask — 100 ml.

6.3 Pipettes — 1 ml capacity, graduated in 0.01 ml; 5 and 10 ml capacity, graduated in 0.1 ml.

*Guide for sensory evaluation for foods: Part 1 Optimum requirements.

†Guide for sensory evaluation of foods: Part 2 Methods and evaluation cards.

‡Method for test for pungency of chillies by Scoville heat units.

§Specification for water for general laboratory use (second revision).

6.4 Analytical Balance

6.5 Beakers — 25 ml capacity with 5 ml marking.

7. PROCEDURE

7.1 Preparation of Stock Solution

7.1.1 *Whole Ginger Rhizome/Powder* — The moisture has to be reduced to 10 percent after making slices and powdered to pass through 710 μm is sieve.

7.1.1.2 Dilute 50 ml of aliquot of 7.1.1 to 250 ml with 3 percent sugar solution. This stock solution corresponds to a dilution of 1:500 (Appendix B).

7.1.2 *Ginger Oleoresin* — Dissolve 0.2 g of oleoresin in 100 ml ethanol. The stock solution corresponds to a dilution of 1:500 (Appendix B).

7.2 Instructions for Sensory Testing for Pungency

7.2.1 Scoville tests are carried out as threshold tests as prescribed in 4.3.1 of IS:6273 (Part 2)-1971*.

7.2.2 Give 4-5 dilutions (5 ml each) of test solution in sequential order from highest dilution below. Use varying number of blanks at the beginning of the series. All the samples are to be coded.

7.2.3 Ginger aroma is likely to appear especially while testing fresh samples earlier than pungency threshold. Panel should avoid bias due to this factor.

7.2.4 Allow sufficient time lag (10-20 seconds) between samples. Clear palate well in between samples with warm water or puffed rice.

7.2.5 Use the score card given in Appendix A. Pungency in ginger is felt sharply but vanishes quickly unlike in capsicum or pepper.

7.2.6 Testing should be stopped when a definite pungency is felt using geometric series as the next sample may have high pungency.

7.3 Preliminary Testing

7.3.1 The panel leader shall test the samples preliminarily with a large common ratio (1:5) in making dilution to avoid waste of time by giving too dilute or too strong solutions to the panelists.

*Guide for sensory evaluation of foods: Part 2 Methods and evaluation cards.

7.3.2 After identifying the approximate threshold of sample, prepare dilutions with strength in geometric progression with a closer common ratio (1:1.2) for preliminary testing by the panel. For example, if the panel leader identifies pungency around 25×10^2 SU in ginger powder and 200×10^2 SU in ginger oleoresin, which correspond to dilution as defined in 2.1, the following series can be used for preliminary panel testing:

Place the indicated volume of stock solution (Appendix B) in 100 ml volumetric flask and make up to volume with 3 percent sugar solution.

<i>Ginger Powder</i>		<i>Ginger Oleoresin</i>	
Stock Solution ml (7.1.1.1)	SU $\times 10^2$	Stock Solution ml (7.1.2)	SU $\times 10^2$
14.0	36	1.72	290
16.7	30	2.08	240
20.0	25	2.50	200
23.8	21	3.00	167
27.8	18	3.40	138

7.3.3 Test these series in two sets with a group of (10-15) panelists. Use the sessions to identify a fairly homogeneous group of sensitivity. Test sensitivity with pure natural capsaicin or piperine and define sensitivity. The dilution shall be in accordance with IS:8104-1976* or IS:8105-1976†.

7.4 Final Evaluations

7.4.1 Prepare dilutions from stock solutions in an ascending arithmetic series of concentration around the approximate threshold identified in 7.3.3. The series should differ in concentration by approximately one JND (which is around 0.15 of the threshold value in ginger as identified by experimentation). This series should be prepared by referring to Appendix B. For example, for samples with approximate threshold of 20×10^2 SU for ginger powder and 170×10^2 SU for ginger oleoresin, which correspond to dilutions as defined in 2.1, the following series apply:

<i>Ginger Powder</i>		<i>Ginger Oleoresin</i>	
Stock Solution ml (7.1.1.1)	SU $\times 10^2$	Stock Solution ml (7.1.2)	SU $\times 10^2$
19.2	26	2.27	220
21.7	23	2.63	190
25.0	20	2.94	170
29.4	17	3.44	145
35.7	14	4.00	125

*Method of test for pungency of chillies by Scoville heat units.

†Method for sensory evaluation of pungency of black pepper by Scoville heat units.

7.4.2 Final tests shall be conducted as threshold test with a homogeneous sensitivity group of a minimum of 5 panelists. 3 to 4 repeated tests are done to get 15 to 20 judgements taking care that dilution series are different at each session to avoid positional bias.

8. PRESENTATION OF DATA

8.1 Decode the test series in terms of Scoville units.

8.2 For threshold value of sample, the Scoville unit corresponding to X in the score card is recorded. When intermediate scale values are given as X and $X-1$ for successive samples, the mean of Scoville values of these dilutions are considered as threshold value.

8.3 As threshold values recorded may show, sudden day-to-day variations, periodical check of panelist's sensitivity should be made and values widely differing from normal should be deleted.

8.4 Scoville value is calculated as the arithmetic mean of each panel and in repetition. After screening the data to remove values which are lower or higher than one JND, approximately (0.15) of group average, the mean is calculated to give the Scoville value of the sample.

8.5 Express the pungency threshold of sample as mean Scoville unit with one standard deviation since sensitivity value cannot be an absolute value.

9. TEST REPORT

9.1 The pungency of sample in Scoville Unit (SU) should be reported as mean threshold $\pm 1\sigma$ based on all panelists (**8.2**) in hundreds (that is, $\times 10^2$).

9.2 The test report should contain the definition of panel sensitivity as per 7.3.3 to enable comparison of data obtain by using another panel.

APPENDIX A

(Clause 7.2.5)

SCORE CARD FOR THRESHOLD TEST FOR PUNGENCY IN GINGER

Name _____ Date _____ Time _____

Instructions:

Taste the samples in the following sequential order:

Swallow slowly the whole quantity of the test sample.

Wait for few seconds to recognize pungency, if any (aroma suggesting the spice should not be confused for pungency).

Take some puffed rice and few sips of sugar solution between samples.

Describe the sensation of each sample using the intensity scale given below:

None or sugar solution	0
Different from sugar solution (but pungency non identifiable)	? stimulus threshold
Threshold (pungency identifiable)	X recognition threshold
Weak pungency	1
Medium pungency	2
Strong pungency	3

(Intermediate values should be expressed as ?-X, X-1, 1-2, etc)

<i>Series I</i>		<i>Series II</i>	
Code No.	Score for Intensity	Code No.	Score for Intensity

A P P E N D I X B*(Clauses 7.1.1.1, 7.1.2, and 7.4.1)***ARITHMETIC SERIES OF DILUTION FOR GINGER**

Place the indicated volume of stock solution (7.1.1.1, 7.1.2, SU 500) in 100 ml volumetric flask and make up to volume with 3 percent sucrose solution to obtain corresponding Scoville units.

<i>Oleoresin</i>		<i>Powder</i>	
Stock Solution ml (7.1.2)	SU $\times 10^2$	Stock Solution ml (7.1.1.1)	SU $\times 10^2$
1.25	400	16.7	30
1.35	370	17.2	29
1.47	340	17.9	28
1.61	310	18.5	27
1.79	280	19.2	26
1.92	260	20.0	25
2.00	250	20.8	24
2.08	240	21.7	23
2.17	230	22.7	22
2.27	220	23.8	21
2.38	210	25.0	20
2.50	200	26.3	19
2.63	190	27.8	18
2.78	180	29.4	17
2.94	170	31.2	16
3.12	160	33.3	15
3.33	150	35.7	14

The dilution of required SU may be calculated as follows:

$$\text{Stock solution (7.1.2 or 7.1.1.1)} = \frac{\text{SU of stock solution}}{\text{SU required}} \times 100$$

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